

Pathni (1978), Ritakumari and Nair (1979) and Badola *et al.* (1982). Our observations on sexual dimorphism in *Puntius conchoni* (Ham.-Buch.) is based on the study of fifty male and female specimens each, collected between November 2003 and January 2004. The fishes were segregated on the mentioned sexual dimorphic characters, and dissected for confirmation. We got hundred percent confirmation and then decided to report it for an addition to the scientific knowledge based on the study of morphometric characters.

The detailed morphometric and meristic characters of both male as well as female fish were studied (Table 1), but no striking difference was seen. The differences are (i) male with dark black shade on the dorsal, ventral and anal fins, absent in female (Fig. 1), (ii) Upper portion of the body shining olive green and lower portion silvery in both sexes; but there is pinkish colour in males between these two portions, which is not visible in the female specimens, and (iii) the snout is broader on upper side in the female compared to the male (Fig. 2).

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21. SEXUAL DIMORPHISM IN FLATHEAD GREY MULLET *MUGIL CEPHALUS* (LINNAEUS)¹

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Introduction

Sexual dimorphism is widespread in nature and can be influenced by sex specific natural selection resulting from ecological differences between the sexes (Reimchen and Nosil 2004). Differences in the selective pressures experienced by the sexes can ultimately result in the evolution of sexual dimorphism of morphological traits (Andersson 1994). Many fish species show sexual dimorphism, a condition where males and females are different in colour and/or form, thus sexes can be detected externally.

Comparison of morphological features in males and females of similar length group facilitate to work out the sexual dimorphism. Species that show difference in coloration between sexes are said to display sexual dichromism (Martin Moe 2002).

The study on sexual dimorphism is of great significance in taxonomy, bionomics, reproductive biology, monosex

culture of fishes, hybridization experiments, hormonal sex control, identification of maturity stage, identification of hybrids, breeding season, induced breeding, seedling production technology and also in the observation of courtship and mating, mate selection, and preference.

The study on sexual dimorphism has been carried out in a very few species of fishes like *Tetraodon travancoricus* (Inasu 1993), *Puntius filamentosus* (Thobias 1974), *Priacanthus hamrur* (Tessy and Inasu 1998), and *Ompok bimaculatus* and *Horabagrus brachysoma* (Kurian and Inasu 1997).

The present work deals with the sexual dimorphism of the Flathead Grey Mullet *M. cephalus* belonging to Order Mugiliformes and Family Mugilidae. It is commonly called 'Kanambu', 'Alameen' or 'Thirutha' in Malayalam, 'Madavai' in Tamil, and 'Kathiparega' in Telugu (Talwar and Jhingran 1991). Grey Mulletts are mostly marine, distributed in temperate and tropical seas, estuaries and some rivers, but spawn in the

Table 1: Average body weight in each length group of male and female *Mugil cephalus* (Linn.)

| Length group (mm) | Total number of Fish examined | | Average weight (gms) | |
|----------------------|----------------------------------|--------|----------------------|--------|
| | Male | Female | Male | Female |
| 160-169 | 27 | 31 | 45.71 | 49.40 |
| 170-179 | 38 | 33 | 64.06 | 66.70 |
| 180-189 | 44 | 25 | 79.21 | 82.94 |
| 190-199 | 30 | 41 | 82.5 | 87.00 |
| 200-209 | - | 24 | - | 100.20 |
| 210-219 | - | 27 | - | 108.70 |

sea. This non-predatory fish feeds on zooplankton, phytoplankton and detritus in the bottom mud.

M. cephalus is one of the common species of mullets in the Indian region which is abundant in catches from the Chilka lake (Orissa), Mahanadi and Godavari estuaries, Pulicat lake (Tamil Nadu) and in the backwater lakes of Astamudi and Vembanadu (Kerala). They withstand wide fluctuations in salinity and suitable for brackish water polyculture along with shrimps, *Chanos* and predatory fish like *Lates* (Thampy 2002). Sea ranching of *M. cephalus* has been done successfully in Hawaii (Grimes 1998) and along the Gujarat coast (Anon. 2000). *M. cephalus* is reported as a potential fish for induced maturation and breeding technologies with great success (Rao 2000). So the study on sexual dimorphism is of great significance in this fish as it is a preliminary step to distinguish males and females.

Method

About 320 specimens (males 139 and females 181) of adult *M. cephalus* were collected in fresh condition from February to July 2005 from the estuarine region of Kanakankadavu (Ernakulam district, Kerala). They were sorted into various length groups. The fine morphological differences between males and females of the same length group were studied and compared, and total weight of each fish was recorded separately.

Discussion

In *M. cephalus*, mature male acquires a pinkish red hue on the body particularly on the basal portion of 1st and 2nd dorsal fins, ventral fins and anal fin during the approach of the breeding season, but in females such coloration is not noticed. The fine colour difference between the two sex groups tend to fade once the breeding period is over. This pattern of temporary sexual dichromism is also observed in *Tetraodon travancoricus* (Joshi 2004), *Horabagrus brachysoma* (Inasu 2004), *Anabas testudineus* (Roychan 2005), and *Bendeisis chedra* (Pathani and Gaur 1989). It has a passive or active role in reproductive behaviour as the bright body colour attracts the opposite sex and helps in completing the spawning act (Martin Moe 2002 and Roychan 2005). Variation in colour can also be due to environmental, nutritional and ecological factors, such as competition, and predation. The endocrine glands also play an important role in breeding coloration.

Females are heavier than the males of the same length group. For facilitating a better comparison the average body weight in each length group of male and female is given in Table 1. The large body size of female fish can be explained as the fecundity of the fish. Andersson (1994) reported that females tend to have larger gonads than males with large energy rich eggs, whereas males have much smaller gonads that produce numerous relatively inexpensive sperm.

This study has focused on the ultimate explanations of the observed sexual dimorphism in *M. cephalus* (Linn.), yet it would be interesting to further examine the proximate causes of these differences.

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22. NEW RECORDS OF TWO EEL FISHES FROM GREAT NICOBAR ISLAND, BAY OF BENGAL¹

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Highly diversified fishes occurring in the coastal waters and coral reef areas of the Andaman and Nicobar Islands have been a source of continuous biodiversity research by various ichthyologists (Rao *et al.* 2000). During the present study, detailed investigations on the fish samples collected from the coral reef areas around the Great Nicobar Island were made. A total of 176 species of fin fishes belonging to 106 genera, 71 families and 15 orders were recorded. Among these, two species are new distributional records to Andaman and Nicobar Islands, Bay of Bengal. The descriptions of these two fishes belonging to families Muraenidae and Moringuidae, classified under the order Anguilliformes, are given here.

Systematic Account

Order: **Anguilliformes**

Family: **Muraenidae**

1. Ribbon Eel *Rhinomuraena quaesita* Garman 1888

Rhinomuraena quaesita Garman 1888. Bull. Essex. Inst. Pp. 114.

Rhinomuraena quaesita: 1990. Randall *et al.* Fishes of the Great Barrier Reef and Coral Sea. Pp. 41.

Material examined: One specimen, 20.i.2003, Lashman beach, east coast of Great Nicobar Island, Reg. No. 5167(A).

Description (mm): Total length 755, eye diameter 4, distance from snout to dorsal 30, body depth 15, caudal fin length 4, length of dorsal fin 725, ventral 510. Body slender and elongated; cleft of mouth reaching far behind eye; triserial villiform teeth in both the jaws; tip of jaws with barbel-like

filamentous appendages; tube of anterior nostril with foliaceous appendages; dorsal and anal fins well developed, origin of dorsal fin well before gill openings; pectoral fins absent; dorsal, anal and caudal fins confluent. Body bluish black with yellow dorsal fin, anal fin black; both dorsal and anal fins with white margin.

Habitat: Found in sandy beach areas.

Distribution: Central and western Pacific to Islands of Indian Ocean.

Family: **Moringuidae**

2. Black-tailed Thrush Eel *Moringua bicolor* Kaup 1856

Moringua bicolor Kaup 1856. Cat. Apod. Fish. Pp. 107.
Rataboura bicolor: Munro 1982. The Marine and Freshwater Fishes of Ceylon. Pp. 63.

Material examined: One specimen, 16.ii.2003, Kichad Nullah, west coast of Great Nicobar Island, Reg. No. 5168(B).

Description (mm): Total length 685; eye diameter 3; distance from snout to dorsal 630; depth of the body 14; length of pectoral fin 6; caudal 5; dorsal 55; ventral 50; 5 conical and short teeth arranged in single rows in jaws. Body elongate, worm-like and cylindrical; posterior nostril opens in a pore in front of eye; eyes small and covered with skin; lower jaw projecting a little in front of snout; lateral line present; dorsal and anal fins small, confined to tail region; caudal region forming a point with which dorsal and anal fins are confluent with caudal fin. Upper half of body brownish and lower half pale yellow, caudal fin blackish with a white edge, other fins light yellow.